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Overweight, body image and bullying—an epidemiological study of 11- to 15-years olds

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Background: The purpose of this study was to examine the association between weight status and exposure to bullying among 11-, 13- and 15-year-old Danish school children. Furthermore, the purpose was to investigate the potentially mediating effect of body image. **Methods:** Data from the Danish contribution to the international cross-sectional research project Health Behaviour in School-aged Children (HBSC) 2002 was used. Data were assessed from questionnaires and 4781 students aged 11-, 13- and 15-years old were included in the analyses. Logistic regression was used for the analyses. **Results:** The regression analyses showed that overweight and obese students were more exposed to bullying than their normal weight peers. Among boys, odds ratios (ORs) for exposure to bullying were 1.75 (1.18–2.61) in overweight and 1.98 (0.79–4.95) in obese boys compared with normal weight. Among girls, the corresponding ORs were 1.89 (1.25–2.85) in overweight and 2.74 (0.96–7.82) in obese girls. The mediation analyses showed that body image fully mediated the associations between weight status and exposure to bullying in both boys and girls. **Conclusions:** This study shows that overweight and obese boys and girls are of higher odds of being exposed to bullying than their normal weight peers. Moreover, this study finds that body image may statistically explain this association between overweight and exposure to bullying. However, the study is cross-sectional, and hypotheses of possibilities for opposite causality are possible.

Keywords: overweight, body image, bullying, adolescents

Introduction

Overweight and obesity are increasing problems around the world and have several physical and psychological health consequences in children, adolescents and adults.[1] Exposure to bullying has been linked to overweight in children.[2–7] Children who are exposed to bullying have higher risks of health problems and poor well-being, e.g. head- and stomach ache, disturbed sleep, anxiety and depression.[8–10] These health problems even tend to track into adulthood.[11] Bullying is defined as a deliberate, repeated or long-term exposure to negative acts performed by a person or group of persons regarded as having a higher status than the victim.[12] Bullying can be expressed both as physical, verbal and relational harassment.

Many adolescents are both burdened by overweight and exposure to bullying and are therefore in great risk of the mentioned health outcomes, but little is known about the mechanisms behind the association between overweight and exposure to bullying. Earlier studies of the association between overweight and a range of psychological outcomes, for instance depression, suicide attempts and low self-esteem, indicate that body image and weight dissatisfaction may be mediating factors.[13–18] Body image is a person's own impression of his or her body. Body image reflects actual body composition, body-related experiences, lifelong social response to body appearance and sociocultural body values and ideals.[13] In the Western culture, the male body is ideally muscular and the female body is thin and young people who fail—or feel that they fail—to reach these ideals may suffer from lower self-esteem.

Six previous papers have examined the association between overweight and exposure to bullying in general among children and adolescents.[2–7] Cross-sectional studies of children between the ages of 6–17 years from the US,[2] Canada,[3] Wales,[4] Australia[6] and England[7] have all found an association between weight status and exposure to bullying. Griffiths *et al*. studied the association in a prospective design of 7.5- to 8.5-year-old English children, and found that weight status predicted exposure to bullying a year later.[5] Only one of the six studies investigated possible explanatory factors for the association between overweight and exposure to bullying. The results of this study of 376 11- to 14-year-old English school students indicated that both global self-worth, self-esteem for physical appearance and body dissatisfaction each fully mediated the relation between weight status and being exposed to bullying.[7] Because of the few studies in this area, it is important to increase knowledge about these associations and mechanisms in other settings and other populations. Therefore, the purpose of the present study was to examine the association between overweight and exposure to bullying in a cross-sectional study of 11-, 13- and 15-year-old Danish students. Moreover, the purpose was to examine the potentially mediating effect of body image. We focus on adolescence as a period of changes and challenges where the person also becomes more dependent on peer relationships and peer acceptance.[9] During puberty, the body changes dramatically and while boys experience positive feelings towards body changes in muscularity, girls become more dissatisfied with their body due to increased body fat accumulation.[19]

Methods

Population

Data used in this study comes from the Danish contribution to the Health Behaviour in School-aged Children study (HBSC) 2002, which is a standardized international WHO collaborative

survey with repeated cross-sectional data collections among 11-, 13- and 15-year-old students in representative samples of schools in the participating countries.[20] In Denmark, 79 schools were randomly selected and 68 of these agreed to participate with a total of 5400 students in the relevant grades. Of these, 4824 (89.3%) returned a complete questionnaire that was included in the data file. For the purpose of this study, 43 students who did not answer the question on exposure to bullying were omitted. Hence, this study comprised 4781 students in the relevant age groups.

There is no formal agency for ethical approval of school surveys in Denmark. Therefore, we asked the school leader, the board of students and the board of parents in each of the participating schools for assessment and approval of the study. Participation was anonymous and voluntary.

Variables

Weight and height status were measured by the items: 'How much do you weigh without clothes?' and 'How tall are you without shoes?' BMI (Body Mass Index) was computed as weight/height^2 (kg/m^2). Overweight and obesity were determined using the internationally standardized age- and sex-specific metric proposed by Cole *et al.*[21] This metric provides cut-off points for BMI in childhood and adolescence linked to adult BMIs of 25 and 30 kg/m^2. About 12% of the students did not answer one or both of these items, and missing data were coded as a special category in the weight status variable. We did so to maintain power in the analyses and to investigate if this special group differed from the students, who answered the questions.

Exposure to bullying was measured by the item: 'How often have you been bullied at school in the last couple of months?'.[22] The responses were dichotomized into having been bullied 2–3 times a month or more vs. bullied less than 2–3 times a month. This dichotomization is in accordance with the recommendations from Olweus who developed the measurement.[22]

Body image was measured by the item: 'Do you think your body is. . .?' and with following response categories: much too thin, a bit too thin, about the right size, a bit too fat, much too fat.

We included socio-demographic variables as potential confounders in the analyses. Socio-economic position was measured by mother and father's occupational status, based on the student's response to items about their parent's occupation. Mother and father's occupational status were coded into social Classes I–V in accordance with the standards of the Danish National Institute of Social Research. We classified the students by the highest ranking parent. Social Class VI was added representing economically inactive parents including people on transfer income, sickness benefits and disability pension. Another category (non-categorizable) was added: parents who are known to be in the labour market but where information was inadequate to categorize them into social classes. Family social class was recoded into the levels high (I–II), middle (III–IV), low (V–VI) and non-categorizable.

Ethnic background was measured by four items and dichotomized into the categories shown in parentheses: 'Are you born in Denmark (yes/no)?', 'In which country was your father/mother born? (in Denmark/outside Denmark)' and 'What language do you most often speak at home? (Danish/other than Danish)'. The four items were summed to a new variable indicating the level of Danish background from 0 to 4 indicators of Danish background. This means that students categorized as four are born in Denmark by parents who are both born in Denmark and primarily speak Danish at home.

Type of family was categorized into four groups: traditional family (living with both parents), one-parent family (living with one parent), reconstructed family (living with one parent and his/hers new partner) and other.

Statistical analyses

All analyses were carried out by SAS version 9.1. First, we examined the covariates association with determinant and outcome by χ^2-test and bivariate logistic regression analysis, respectively.

Second, we used multivariate logistic regression with stepwise backwards selection to examine the associations between weight status and being bullied (Model I). As a starting point weight status, grade, family social class, type of family and ethnic background were included as potential confounders.

The mediation effect[23] of body image was examined by adding body image to the final regression model (Model II) considering the change in association between weight status and exposure to bullying. All regression analyses were run by PROC GLIMMIX to account for the design effect caused by the cluster sampling approach by which school was the sampling unit.

Finally, we examined by χ^2-tests how the students not answering height and/or weight differed from those who did answer the questions. Moreover, we used χ^2-tests to investigate whether those students not included in the analyses because of missing answers in one or more variables differed from those included with respect to relevant variables.

Results

In this study, 11.2 % had been exposed to bullying 2–3 times a month or more during the past couple of months. Moreover, 8.6% were classified as overweight and 1.1 % as obese (table 1). Bivariate logistic regression analyses showed that among students exposed to bullying, there was a statistically significant accumulation of overweight students ($P < 0.000$), of students in the lower grades ($P < 0.000$), of students, who do not consider their bodies to have the right size ($P < 0.000$) and of students with lower family social class ($P < 0.000$). This tendency was also present when stratified for sex. Moreover, there was a statistical significant accumulation of girls in non-traditional family types among girls exposed to bullying ($P = 0.001$). The logistic regression analysis of the association between body image and exposure to bullying showed a significant association ($P < 0.000$) with a U-shaped pattern. Students who are dissatisfied with their body image, both feeling too thin and too fat, have greater odds for being bullied (table 1).

The covariates of ethnicity and type of family were excluded from the final multivariate regression model, since they showed no association with either exposure to bullying or weight status. Model I thus included weight status, grade and family social class.

Table 2 shows that for both boys and girls the crude analyses show a significant and graded relationship between weight status and exposure to bullying with ORs for being bullied increasing by weight status. Among boys, the OR for exposure to bullying is 1.74 (1.18–2.57) in overweight boys. Further, there was a high although not significant accumulation of bullying [OR = 2.05 (0.83–5.08)] in obese compared with normal weight boys. Among girls, the OR for exposure to bullying is 1.88 (1.25–2.83) in overweight and 3.60 (1.37–9.47) in obese girls. In Model I, the ORs attenuate slightly for obese boys and girls after adjustment for grade and family social class.

ORs for bullying according to weight status attenuate dramatically from Models I to II and for both boys and girls the association becomes insignificant ($P_{boys} = 0.441$ and $P_{girls} = 0.972$). The mediating effect of body image is more pronounced among girls than among boys. Among obese boys, ORs for exposure to bullying are reduced from 1.98 (0.79–4.95) to 1.14 (0.41–3.17). Among obese girls, the corresponding ORs are reduced from 2.74 (0.96–7.82) to 0.87 (0.28–2.65).

Table 1 Characteristics of study population, in total and stratified for exposure to bullying ≥2–3 times a month

	Distribution in percent (*n*)			Percent who are bullied ≥2–3 times a month		
	Total *n* = 4781	**Boys** *n* = 2322	**Girls** *n* = 2459	**Total** *n* = 542 (11.2%)	**Boys** *n* = 269 (11.6%)	**Girls** *n* = 273 (11.1%)
Exposure to bullying the last couple of months						
Have not	68.3 (3265)	68.6 (1594)	68.0 (1671)			
Only one or two times	20.4 (974)	19.8 (459)	20.9 (515)			
2–3 times a month	4.3 (205)	4.7 (110)	3.9 (95)			
About once a week	2.9 (137)	2.8 (65)	2.9 (72)			
Several times a week	4.2 (200)	4.0 (94)	4.3 (106)			
Weight status						
Normal weight	78.4 (3746)	76.9 (1786)	79.7 (1960)	10.2	10.5	9.9
Overweight	8.6 (409)	9.2 (213)	8.0 (196)	16.9	16.9	16.8
Obese	1.1 (53)	1.3 (31)	0.9 (22)	22.6	19.4	27.3
Missing	12.0 (573)	12.6 (292)	11.4 (281)	13.8	13.7	13.9
P-value				<0.000	0.012	0.001
Grade						
5th	36.3 (1736)	35.6 (827)	37.0 (909)	14.1	14.5	13.6
7th	33.7 (1612)	34.6 (803)	32.9 (809)	12.2	12.5	11.9
9th	30.0 (1433)	29.8 (692)	30.1 (741)	7.1	7.1	7.2
P-value				<0.000	<0.000	<0.000
Body image						
Much too thin	1.6 (77)	1.4 (32)	1.8 (45)	26.0	40.6	15.6
A bit too thin	11.4 (546)	12.7 (296)	10.2 (250)	12.1	12.5	11.6
About the right size	52.8 (2524)	60.4 (1402)	45.6 (1122)	8.4	9.2	7.5
A bit too fat	29.1 (1391)	22.3 (517)	35.5 (874)	12.6	14.1	11.7
Much too fat	4.2 (199)	2.2 (52)	6.6 (147)	32.7	30.8	33.3
Missing	0.9 (44)	1.0 (23)	0.9 (21)	6.8	4.3	9.5
P-value				<0.000	<0.000	<0.000
Family social class						
High	22.2 (1059)	23.1 (536)	21.3 (523)	7.9	8.8	7.1
Middle	48.6 (2323)	47.1 (1093)	50.0 (1230)	11.0	10.9	11.1
Low	18.7 (896)	18.3 (424)	19.2 (472)	14.1	15.3	12.9
Non-catagorizable	9.6 (458)	10.4 (242)	8.8 (216)	15.3	14.9	15.7
Missing	0.9 (45)	1.2 (27)	0.7 (18)	15.6	7.4	27.8
P-value				<0.000	0.005	0.002
Type of family						
Traditional family	59.9 (2862)	61.2 (1420)	58.6 (1442)	10.6	11.7	9.5
One-parent family	15.2 (727)	15.5 (359)	15.0 (368)	12.5	11.4	13.6
Reconstructed family	11.9 (567)	11.2 (260)	12.5 (307)	13.9	11.9	15.6
Other	1.9 (90)	1.7 (39)	2.1 (51)	15.6	10.3	19.6
Missing	11.2 (535)	10.5 (244)	11.8 (291)	10.3	11.1	9.6
P-value				0.050	0.990	0.001
Numbers of indicators of Danish ethnicity						
0	4.0 (190)	4.0 (94)	3.9 (96)	11.0	14.9	7.3
1	3.1 (148)	3.1 (71)	3.1 (77)	12.8	8.5	16.9
2	2.7 (131)	3.1 (72)	2.4 (59)	16.0	15.3	16.9
3	9.0 (431)	9.3 (215)	8.8 (216)	11.1	9.8	12.5
4	81.2 (3881)	80.5 (1870)	81.8 (2011)	11.1	11.6	10.7
P-value				0.506	0.508	0.158

P-values represent test for association in logistic regression analysis.

Table 2 Crude, adjusted (Model I) and mediation (Model II) analysis for exposure to bullying ≥2–3 times a month in the last couple of months by weight status and body image, respectively, and stratified by sex [OR (95% CI)]

	Boys			Girls		
	Crude	**Model I**[a]	**Model II**[a]	**Crude**	**Model I**[a]	**Model II**[a]
Weight status	*N* = 2322	*N* = 2295	*N* = 2273	*N* = 2459	*N* = 2441	*N* = 2420
Normal weight	1	1	1	1	1	1
Overweight	1.74 (1.18–2.57)	1.75 (1.18–2.61)	1.43 (0.92–2.23)	1.88 (1.25–2.83)	1.89 (1.25–2.85)	1.09 (0.69–1.72)
Obese	2.05 (0.83–5.08)	1.98 (0.79–4.95)	1.14 (0.41–3.17)	3.60 (1.37–9.47)	2.74 (0.96–7.82)	0.87 (0.28–2.65)
Missing	1.36 (0.94–1.97)	1.21 (0.83–1.76)	1.16 (0.78–1.71)	1.46 (1.00–2.13)	1.30 (0.88–1.90)	1.02 (0.68–1.53)
P-value	0.012	0.023	0.441	0.001	0.001	0.972
Body image	*N* = 2299			*N* = 2438		
Much too thin	6.84 (3.29–14.23)		7.13 (3.38–15.02)	2.15 (0.92–4.99)		2.00 (0.85–4.68)
A bit too thin	1.40 (0.95–2.07)		1.56 (1.05–2.34)	1.60 (1.02–2.51)		1.59 (1.00–2.52)
About the right size	1		1	1		1
A bit too fat	1.62 (1.19–2.20)		1.52 (1.10–2.12)	1.63 (1.21–2.22)		1.73 (1.25–2.39)
Much too fat	4.40 (2.37–8.18)		3.39 (1.67–6.87)	6.04 (3.99–9.16)		6.36 (3.97–10.19)
P-value	<0.0001		<0.0001	<0.000		<0.0001

a: Adjusted for grade and family social class.

The ORs for exposure to bullying increase by degree of dissatisfaction with one's body image with both feeling too thin and too fat, respectively. Among boys, the highest OR is seen when they think their body is much too thin [OR = 7.13 (3.38–15.02)] while the highest OR among girls is observed when they think their body is much too fat OR = 6.36 (3.97–10.19).

Non-respondents were analysed by χ^2-tests. Students, who did not answer questions on weight and/or height, differed from the rest in a range of variables. There were larger proportions of missing answers among students in the lower grades ($P < 0.000$), among those bullied ≥2–3 times a month ($P = 0.049$), among students who thought their body was too fat ($P = 0.002$), among those with lower family social class ($P < 0.000$) and with few indicators of Danish ethnicity ($P < 0.000$). Analyses of non-respondents on family social class, type of family and body image ($n = 88$) showed that in this group significantly more students did not report their height and/or weight ($P < 0.000$).

Discussion

The present study has two key findings; first: in both boys and girls, the risk of being bullied is higher among overweight and obese 11-, 13- and 15 year-old students compared with their normal weight classmates. Second, this association between weight status and exposure to bullying seems to be mediated by body image.

The results of this study are in accordance with results of previous studies examining the association between weight status and exposure to bullying.[2–7] All these studies support the finding that the risk of exposure to bullying is greater among overweight and obese students than among normal weight students.

Only one previous study[7] has focused on examining mediating factors, explaining the association between overweight and exposure to bullying. Their results indicated that both global self-worth, self-esteem for physical appearance and body dissatisfaction each fully mediated the relation between weight status and exposure to bullying. The study comprised 201 boys and girls but only 54% of the original sample provided useful data of height and weight. While children who are bullied often have characteristics that make them stand out from their classmates, the characteristics are not necessarily the reason, why they are being bullied. Some scholars in bullying behaviour point to low self-esteem as a reason why some children are bullied and others are not.[12,24] Previous research has shown that overweight and obese children are more likely to report greater dissatisfaction with their body and lower self-esteem compared with normal weight children.[15,25,26] Hence, it may be that the lower self-esteem in the overweight and obese students in some way are communicated to their classmates which make them easy targets for bullying.

The pattern of associations between weight status and exposure to bullying was more or less the same among boys and girls. In both boys and girls, we found an U-shaped relation between body image and exposure to bullying, indicating that the further away from 'the right size' the students think of their body, the greater risk of exposure to bullying. However, while boys were in much higher risk of exposure to bullying, when they thought their body was much too thin, the girls reported more bullying when they thought their body was much too fat. Although Fox and Farrow (2009) investigated mediating factors, they did not specifically look for gender differences, but concluded, that no significant differences were seen between boys and girls.[7] Among boys, it is high status to be physically strong while being skinny is an indication of weakness.[12] Among girls, there is no advantage of being physically superior—on the contrary there is a large pressure on young girls to live up to the extremely slim ideal of female body composition.[15] Therefore, it seems plausible that low self-esteem may result in feeling too fat among girls and too thin among boys.

The present study has some limitations; the results indicate that overweight and obese students are more exposed to bullying than normal weight students, and that the mechanism behind this may be negative body image. However, this study is based on cross-sectional data and therefore it is not possible to make conclusions about causality. It might be that negative body image is rather a consequence of being bullied than a precursor. It is also possible that some children would start over-eating as a way of coping with being bullied and/or having a negative body image. Longitudinal research is needed to establish the correct causal pathways. Even though this study has a high participation rate, selection bias may be present. Research shows that both bullied[27] and overweight[28] students are more absent from school. This possible bias may have resulted in underestimated ORs. However, this study has a high response rate that reduces the risk of bias consequences. Another source of selection bias may occur if the students who were excluded from the analyses due to missing answers in one or more variables are different from the included students. Comparison between participants and non-participants in the study, however, did not reveal such problems. An additional source of bias may be information bias. It is well-known that BMI calculations based on self-reported height and weight are underestimated.[29–32] However, due to economic and ethical considerations self-reported data may be the best way to measure weight status in large surveys. The potential underreporting of BMI in this study may have resulted in underestimated associations between weight status and exposure to bullying.

This study suggests that negative body image may explain why overweight and obese students are bullied more than their normal weight peers. Regardless of the processes which connect overweight and bullying, the most radical and effective way to deal with the problem may be to intervene against bullying. First, bullying seems to be related to the social context[33] rather than to individual characteristics of the victims.[12] Second, there is now a bulk of intervention research which suggests that it is possible to reduce bullying considerably by pedagogical and structural interventions at the school level.[34] These studies also demonstrate that individual level interventions directed at the victims of bullying cannot stand alone. Interventions at the school level including multiple tools and levels are the most efficient to reduce bullying exposure among school students.[34]

Another potential strand of interventions relate to the presentation of the perfect body in media and advertisements. Policies to encourage a more relaxed attitude to body shape in media and adds may be difficult to implement but it is important to support research which explores whether such efforts could have beneficial public health effects.[35]

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Key points:

- This study confirms what has already been shown earlier, that overweight children and adolescents are more exposed to bullying than their normal weight peers.
- This study adds to the previous studies by demonstrating that body image mediates the association between overweight and exposure to bullying.
- While boys seem to have a greater risk of being bullied, when they think their body is too thin, girls have higher risks, when they think their body is too fat.
- Regardless of the processes, which connect overweight and bullying, it is important to intervene against bullying because of its multiple harmful consequences.

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